

THE AMERICAN MINERALOGIST

VOL. 4

FEBRUARY, 1919

No. 2

CRYSTALLOGRAPHY OF SOME CANADIAN MINERALS. ALBITE, TITANITE, SCAPOLITE AND POLYCRASE¹

EUGENE POITEVIN

Geological Survey of Canada

1. ALBITE, TEMPLETON, QUEBEC

The specimens which form the subject of this note were collected by Dr. M. E. Wilson of the Geological Survey at the Murphy Apatite mine, S1½ 10-X, Templeton, Ottawa county, Quebec. They consist of highly cavernous masses composed of an association of augite, phlogopite and feldspar, the cavities in which are lined or filled with crystallized fluorite, albite and calcite.

The augite is generally greenish-black in color and takes the form of small rod-like individuals averaging 2 mm. in length. The phlogopite is in small brownish scales, sometimes partially altered to a chloritic mineral. Fluorite individuals are very small, not exceeding 0.5 cm. in diameter. They are pale blue in color and transparent and exhibit the cube face in combination with the octahedron, the latter being the dominating form. The augitic portions of the mass are plentifully dotted with small yellowish spheres of palygorskite, which appear, in part at least, to be the result of alteration of the augite itself.

The albite crystals are found resting both on massive feldspar, from which they have no doubt been derived by recrystallization, and on fluorite. They are relatively small and do not exceed 4 mm. in length. They are transparent and colorless and are doubly terminated. They assume a rather broad tabular habit due to the relatively high development of the side pinacoid $b(010)$, parallel with which the twinning of the crystals takes place. The remaining forms are about equally developed.

A number of crystals were measured on the two-circle goniometer and afforded the following forms:

$b(010)$, $c(001)$, $z(130)$, $m(110)$, $p(\bar{1}11)$, $o(\bar{1}\bar{1}1)$, $f(130)$, and $n(0\bar{2}1)$.

¹ Published by permission of the Director of the Geological Survey of Canada.

2. TITANITE, ONTARIO AND QUEBEC

Fine crystals of titanite are frequently met with in the Archaean rocks of eastern Ontario and western Quebec, and in recent years good examples have been received by the Museum of the Geological Survey from 21-XI, Litchfield, Pontiac County, Quebec and 23-XV, Lyndoch, Renfrew County, Ontario.

A contact twin collected from the former locality by Mr. A. T. McKinnon measured 5 cm. in diameter. It was found associated with orthoclase, scapolite, pyroxene and calcite and exhibited fine lustrous faces. The twinning plane was found to be $a(100)$.

The crystals from the Lyndoch locality measured up to 3 cm. in length and exhibited bright and well developed faces.

The crystals were measured with the contact goniometer and yielded the forms indicated below:

Litchfield, Pontiac County

$c(001)$, $m(110)$, $n(111)$, $t(\bar{1}11)$, $l(\bar{1}12)$, $a(100)$

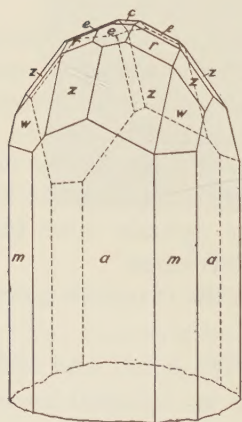
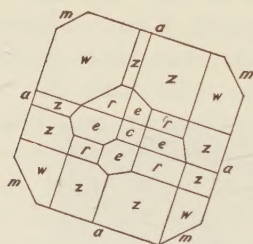


FIG. 1. Scapolite, Templeton.

Lyndoch, Renfrew County

$c(001)$, $m(110)$, $n(111)$, $t(\bar{1}11)$

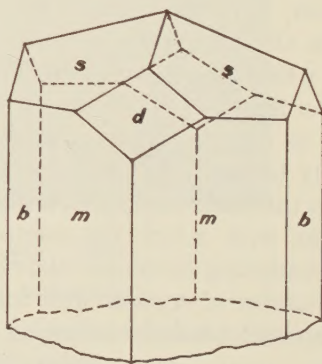
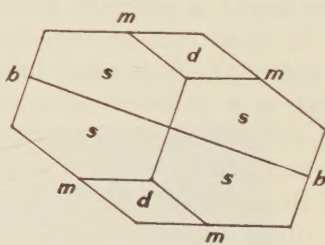


FIG. 2. Polycrase, Cameron.

3. SCAPOLITE, TEMPLETON, QUEBEC

Scapolite has long been known as an associate of mica and apatite in many of the mines of Ottawa County, Quebec. It occurs both in massive forms as well as crystal aggregates, and not infrequently crystals of large dimensions are met with.

An individual collected by Dr. M. E. Wilson of the Geological Survey at the No. 2 Shaft of the Wallingford mine, Battle Lake, 5-XIII, Templeton, Quebec, measures 15 cm. in length and 10 cm. in thickness. Measured with a Penfield contact goniometer the following forms were observed:

$a(010)$, $m(110)$, $c(001)$, $e(101)$, $r(111)$, $z(311)$, $w(331)$.

The faces are generally rough and the pyramids are not infrequently incrustated with minute crystals of pyroxene. Small mica crystals are scattered thru the mass of the specimen. Figure 1 shows the habit of the crystal, in orthographic and clinographic projections.

4. POLYCRASE, CAMERON, ONTARIO

A number of the crystals of this mineral from 7-A Cameron, Nipissing district, Ontario, belonging to the collection of the Geological Survey, yielded on measurement the following forms:

DANA		GOLDSCHMIDT
c	(001)	c
b	(010)	a
s	(111)	s
d	(201)	x

The finest crystal measured is represented in orthographic and clinographic projections in Figure 2. Some of the crystals are twinned parallel with $b(010)$.

NEWSPAPER MINERALOGY

How can the public gain accurate information about scientific matters when the press persists in getting things twisted? During the course of the war some means for rendering the gas used to inflate balloons non-inflammable was greatly desired, and admixture with the usual hydrogen of a small amount of the inert gas helium, or argon, as it was called for camouflage, was found to be of great value in this connection. The helium has been obtained from natural gas from the wells at Petrolia, Texas. In an account of this discovery which has recently been published in the daily papers two remarkable statements are made. One is that the gas used for balloons is nitrogen. The other is in connection with the inert gas; in order to explain what helium is, the writer of the notice says: "Helium is indicated to be a plentiful part of the sun's *minerals* by spectrum analysis" We are indeed glad to learn that there may be famous mineral localities in the sun.

DEVELOPING CRYSTALLIZED MINERAL SPECIMENS¹

WALLACE GOOLD LEVISON

Brooklyn, N. Y.

For many years I have used the method of trimming with a vise described by Mr. J. A. Grenzig in the July, 1918, number of this magazine, but not with a file for a cutter. Mr. Grenzig's piece of file is easy to provide and no doubt an effective cutter, but is likely to fall out of the vise when the rock splits. My cutter, as a result of long experience, is made as follows:

From a bar of tool steel 4 cm. wide by 16 mm. thick saw a piece 6 cm. long. Then from the plate thus obtained saw out a rectangular rabbet leaving the long side 8 mm. thick and the short side 2 cm. wide. Then file the short side to an angle of 60° (the same as a file), or less.

Or, procure a piece of 16 mm. triangular bar tool steel 4 cm. long and a piece of wrought iron bar 16 mm. wide, 8 mm. thick and 6 cm. long. Drill and tap a hole on the center line of one side of the triangular piece half the thickness of the iron bar from its end and insert therein a piece of a screw, leaving 6 mm. projecting. Drill and tap a similar hole in the center of the end of the piece of iron and screw them together at a right angle.

Whether made all of one or of two pieces, the cutter is similar and resembles in form a carpenter's square. In use it hangs on the jaw of the vise by the long side, which may be bent to conform with the shape of the jaw if desired, and which keeps it from falling when the rock splits.

It need not be hardened and if not hardened it may be sharpened by filing, which is rarely necessary. If hardened it should be tempered to a medium bronze or brown yellow. The blacksmith at any quarry will harden and temper it in a few moments. It must then be sharpened by grinding.

The late F. L. Smith and I both used this cutter for trimming small specimens for Rakestraw mounts with a Stevens lever vise very successfully for many years, but a large screw vise is required to afford sufficient power for trimming cabinet specimens.

Another extremely convenient device is a machinists' cold chisel holder. This is a lever hinged to a long arm projecting

¹ Continuation of symposium begun in volume 2; see numbers for August, 1917, p. 101 and July, 1918, p. 152.

normally from the side of a little anvil which is to be held in a vise. In the free end of the lever over the anvil a cold chisel is clamped. The specimen is located on the anvil under the chisel and held with the left hand while the chisel is struck with a hammer held in the right hand. Thus only the waste piece can fall when detached.

BOOK REVIEW

HANDBOOK OF MINERALOGY, BLOWPIPE ANALYSIS AND GEOMETRICAL CRYSTALLOGRAPHY. G. MONTAGUE BUTLER, E. M. John Wiley & Sons, Inc. New York, 1918. 667 pp., 196 figs., 5 tables.

This volume is the combined edition of Professor Butler's three books, bound in the order of their appearance, altho this causes the descriptive part to appear before the parts on blowpipe analysis and crystallography,—a reversal of the usual arrangement. Each part, incidentally, is separately paged, contains its own preface, table of contents and index. Designed for field use, the book is small octavo in size, with a flexible cover, and can be easily carried in the pocket.

In the first part 226 minerals are described in Dana's order. Only the essential characters are given, the distinctive or diagnostic ones being emphasized with bold-faced type. The commercially important minerals are afterwards listed, also the retail prices of gems, and the value of metals and minerals; this part concludes with a glossary and 5 tables giving the properties of the minerals described.

The second part, on blowpipe analysis has been designed for the use of students and prospectors with the idea of making oral instruction unnecessary, and is characterized by simplicity and conciseness. The elementary principles of chemistry are given, however, after the sections on laboratory work.

The last part, Geometrical Crystallography, has been written as an aid in the sight determination of minerals, hence only the essential features of the subject are presented,—the recognition of crystal forms. S. G. G.

NOTES AND NEWS

The British Educational Mission which has been touring the United States during the past few months, included two mineralogists, Sir Henry A. Miers, author of a text-book of Mineralogy and of numerous researches on crystallization phenomena, and Professor John Joly, well known for his geochemical researches, and for recent studies on the significance of pleochroic haloes.

We learn from *Science* that during last summer the Gail Borden collection of minerals, belonging to Occidental College, Los Angeles, has been placed in a favorable position for examination. This collection contains some of the finest mineral specimens on exhibition in southern California, and facilities for their study will be extended to visiting mineralogists.

Dr. Norman L. Bowen has resigned from the Geophysical Laboratory of the Carnegie Institution to accept the Professorship of Mineralogy in Queens University, Kingston, Canada.

At the meeting of the Geological Society of America in Baltimore, December 27-28, 1918, the question of the formation of a Mineralogical Society of America was informally discussed by mineralogists present. A full report of the conclusions reached will be published later. Several papers of mineralogic interest were presented at the meeting.

All measurements given in this magazine will hereafter be stated in metric units; authors of papers are requested to observe this, altho the equivalents in other units may be added in parentheses if desired.

PROCEEDINGS OF SOCIETIES

PHILADELPHIA MINERALOGICAL SOCIETY

Wagner Free Institute of Science, December 12, 1918

A stated meeting of The Philadelphia Mineralogical Society was held on the above date, with the president, Dr. Leffmann in the chair. Nineteen members and visitors were present.

Mr. Samuel G. Gordon presented a communication on "*The History of Mineralogy in Pennsylvania*." The American Philosophical Society, founded by Benjamin Franklin in 1743 devoted some attention to mineralogy, but the first mineralogical society was initiated as the "Chemical Society of Philadelphia" (1792-1809). Its chief purpose was to acquire information relative to the minerals of the United States. A standing committee of five was charged with the duty of analyzing (without charge) minerals submitted to it.¹

The earliest mineralogists were Adam Seybert (1773-1825), Thomas P. Smith (died 1802), Silvanus Godon (died 1812?), James Woodhouse (1772-1809), Gerard Troost (1776-1850), Lardner Vanuxem (1792-1848), Isaac Lea (1792-1886), William Keating (1799-1848), and Thomas Nuttall (1786-1859). Seybert was the first scientifically trained mineralogist, and Troost, who studied under Abbé Haüy, the first crystallographer in America. His early contributions to this subject have been entirely overlooked by some writers on the history of mineralogic science in America. Seybert's cabinet was the second brought to America (1795-1800), and is kept intact in the original condition, arranged according to Cleaveland's Mineralogy (1816). It is probably the oldest American collection of minerals extant.²

The Academy of Natural Sciences was instituted in 1812, with Troost as the first president. It contains the cabinets of Adam Seybert (purchased in 1812,—its first mineral collection); Silvanus Godon (1814), Thomas M'Euen

¹ This was followed in 1798 by the American Mineralogical Society, founded in New York by Samuel Latham Mitchill.

² This collection was preceded by a cabinet brought from Europe in 1794 by David Hosack, exhibited in New York, and presented to Princeton University in 1821; but the identity of this cabinet has been lost.

(1799-1873), Samuel Ashmead (d. 1864), George W. Carpenter (1802-1860), and William S. Vaux (1811-1882). The Vaux collection, one of the finest in America, is kept intact, and is on exhibition. Deposited in the Academy are the collections of the American Philosophical Society which includes the cabinets of Thomas P. Smith and James Woodhouse; and the collections of the Franklin Institute.

A later mineralogist was Henry Seybert (d. 1884), one of the most brilliant American chemists, who discovered fluorine in chondrodite and beryllium in chrysoberyll.¹

Chester County mineralogists were numerous; Joel Baily (1791-1894) who made the first Chester County collection, now at Swarthmore College, which contains also the cabinet of Joseph Leidy; Lewis White Williams, (1804-1873); William W. Jefferis, (1821-1906) whose collection is exhibited at the Carnegie Museum in Pittsburgh; Charles W. Pennypacker (1845-1911); S. S. Haldeman, Chickies, Lancaster County, made a collection, while Berks County was represented by John Schoenfeld.

Other Philadelphia collectors were Theodore D. Rand (1836-1903) whose collection is at Bryn Mawr College; Col. Joseph Willcox, (1829-1918). Mr. Clarence S. Bement's collection, one of the finest in America, is exhibited in the American Museum of Natural History, N. Y. Mr. George W. Fiss has undoubtedly the largest and finest microscopic collection in the world; and Mr. George Vaux, Jr., of Bryn Mawr, possesses one of the finest private collections of minerals.

The Media Institute of Science contains the collections of Lewis Palmer and of George Smith, early Delaware County collectors. The Wagner Institute museum contains the mineral collection made by William Wagner (1796-1885). Lehigh University contains the collection of Theodore W. Roepper, while the Francis Alger collection is in possession of Allegheny College at Meadville.

Scientifically, Philadelphia became a center of interest in 1870-1880, due to the analytical work of Frederick A. Genth and George Augustus Koenig, professors of chemistry and mineralogy at the University of Pennsylvania. One of Genth's collections became the property of the University, which was also enriched by the Cardeza and Clay cabinets. In 1880 the Mineralogical and Geological Section of the Academy was organized, followed by the Philadelphia Mineralogical Society in 1892.

Sketches of the lives of these men were given. Specimens from the Adam Seybert Collection, and some chemical ware of Henry Seybert were exhibited.

The paper was discussed by Doctors Burgin and Leffmann, and Messrs. Koch and Hagey. Dr. Burgin called attention to the Charles Wistar collection, preserved intact in Germantown.

Mr. Warford presented a report of the condition of the treasury. Upon motion of the treasurer, an appropriation was made to buy stationery for THE AMERICAN MINERALOGIST. The Society then adjourned to examine the exhibits.

SAMUEL G. GORDON, *Secretary*.

¹ Wells and Foote, *Am. J. Sci.* [4] 46, 265, 1918, state that Seybert also discovered boric acid in tourmaline, but this should be credited to Lampadius, *Gilbert's Annalen*, 37, 363, 1818, four years prior to Seybert.

ABSTRACTS OF MINERALOGIC LITERATURE.

THE STRUCTURE OF CRYSTALS. P. NIGGLI. *Z. anorg. allgem. Chem.*, **94**, 207-216, 1916; thru *J. Chem. Soc.*, **110**, ii, 300, 1916.

This author favors the same plan as Pfeiffer (abstracted in *Am. Min.*, **3** (6), 144, 1918), of using coördination numbers for the description of the relations of the atoms in crystals. In many cases, however, groups of atoms rather than single atoms occupy significant points. Thus in pyrite it is the center of gravity between each pair of sulfur atoms which must be considered, in calcite the CO_3 groups, etc.

E. T. W.

NOTE ON THE FUNDAMENTAL POLYHEDRON OF THE DIAMOND LATTICE. ELLIOTT Q. ADAMS. *J. Wash. Acad. Sci.*, **8** (8), 240-241, 1918.

This article was referred to in a footnote in *Am. Min.*, **3** (6), 139, 1918, but not actually abstracted. The convex polyhedron corresponding to this lattice as worked out by the Braggs is shown to be a dodeca-tetrahedron (see figure in place above cited). When the atoms are all alike, as in diamond, the faces of the tetrahedron are truncated until their shape is that of a regular hexagon. Where they are different, as in the sulfides chalcopyrite and stannite, modifications of this figure are represented.

E. T. W.

THE CRYSTALLINE SYSTEM AND AXIAL RATIO OF ICE. F. RINNE. *Ber. Sächs. Ges. Wiss.*, **69**, 57-62, 1917; thru *J. Chem. Soc.*, **114**, ii, 75, 1918.

By an elaborate photographic method, previously described (*ibid.*, **67**, 303, 1915) X-ray diagrams of the positions of the atoms in ice have been obtained, and worked out on the gnomonic-projection basis. The usual interpretation of ice is confirmed,—that is it hexagonal-hemimorphic with $c = 1.4$. According to the author's "law of isotypism," ice thus belongs to the magnesium type.

E. T. W.

THE CRYSTAL STRUCTURE OF ICE. ANCEL ST. JOHN. *Proc. Nat. Acad. Sci.*, **4**, (7), 193-197, 1918.

Independent of the work described in the preceding abstract, ice was studied by the Bragg method. The oxygen atoms, with hydrogens on either side of them, appear to occupy the points in 4 interpenetrating triangular prism lattices, the basal layers of which are grouped in pairs. The spacings (all $\times 10^{-8}$ cm.) are: $d_{0001} = 3.32$, $d_{10\bar{1}0} = 2.37$, and $d_{11\bar{2}0} = 3.79$.

E. T. W.

THE STRUCTURE OF THE CRYSTALLINE FORMS OF SILICA, IRON DISULFIDE, ZINC SULFIDE, AND CALCIUM CARBONATE. J. BECKENKAMP. *Centr. Min. Geol.*, **1917**, 353-365, 393-407; thru *J. Chem. Soc.*, **114**, ii, 9-10, 1918.

This author disagrees with the Braggs as to the structures of many of these minerals, considering them all to be essentially face-centered cubic or a structure derived therefrom.

E. T. W.

THE ARRANGEMENT OF THE ATOMS IN TUNGSTEN. P. DEBYE. *Physik. Z.*, **18**, 483-488, 1917; thru *J. Chem. Soc.*, **112**, ii, 574-575, 1917.

The interference figures obtained by the Debye-Scherrer X-ray method show tungsten to be body-centered cubic, the edge of the cube being 3.10×10^{-8} cm. long.
E. T. W.

THE CRYSTAL STRUCTURE OF IRON. A. W. HULL. *Phys. Rev.*, 9, 84-87, 1917.

The results obtained with iron, already announced briefly (see abstract in *Am. Min.*, 3 (6), 146, 1918) are described in greater detail. The general structure is body-centered cubic, with $d_{100} = 1.43 \times 10^{-8}$ cm., altho certain irregularities observed in the intensities of the X-ray spectra require special assumptions as to the distribution and action of the electrons within the atoms.
E. T. W.

THE CRYSTAL STRUCTURE OF ALUMINIUM AND SILICON. A. W. HULL. *Phys. Rev.*, 9, 654-666, 1917.

X-ray examination of aluminium showed it to be tetragonal, the lattice being body-centered prismatic. Silicon in the same way was shown to have the same structure as diamond, the distance between nearest adjacent atoms being 2.35 as compared with 1.54 for diamond (units = 10^{-8} cm.).
E. T. W.

THE SPACE LATTICE OF ALUMINIUM. P. SCHERRER. *Physik. Z.*, 19, 23-27, 1917; thru *J. Chem. Soc.*, 114, ii, 113, 1918.

Examination of aluminium powder by the Debye-Scherrer method gave results believed to show its structure to be face-centered cubic. The side of the elementary cube is 4.07×10^{-8} cm., identical with that of gold. The discrepancy between this result and that obtained independently by Hull (preceding abstract) remains to be explained.
E. T. W.

A FUMAROLE YIELDING TENORITE AND ALKALI CHLORIDES IN THE LAVA OF STROMBOLI. G. PONTE. *Atti accad. Lincei*, 26, I, 641-646, 1917; thru *Chem. Abstr.*, 12, 461, 1918.

Mixtures of halite and sylvite colored gray by the presence of 2-3 per cent. of tenorite are described, and their paragenesis discussed.
E. T. W.

CYANOTRICHITE AND DIOPHASE FROM TRAVERSELLA. LUIGI COLOMBA. *Atti accad. Lincei*, 26, I, 487-491, 1917; thru *Chem. Abstr.*, 12, 462, 1918.

Analysis of blue-green stalactites showed them to have approximately the composition of cyanotrichite, with low Al and high H_2O . Minute emerald-green prismatic crystals in the stalactites are regarded as diopase.
E. T. W.

PRECIOUS STONES. GEORGE F. KUNZ. *Mineral Industry*, 25, 608-637, 1916.

Includes notes on diamonds, emeralds, garnets, jadeite, opal, pearls, rubellite, rubies, sapphires and staurolite.
E. T. W.

MEASUREMENTS OF THE RADIOACTIVITY OF METEORITES. T. T. QUIRKE AND L. FINKELSTEIN. *Am. J. Sci.* [4] 44, 237-242, 1917.

The average activity of stone meteorites shows 7.39×10^{-13} g. of radium per gram, of iron-stone ones 6.88, and iron meteorites practically none. The stone meteorites are thus only one fourth as active as granite.
E. T. W.

THE COMPOSITION OF PYROXENES. C. DOELTER. *Centr. Min. Geol.*, **1917**, 185-191; thru *J. Chem. Soc.* **112**, ii, 378, 1917.

The author criticizes recent work on this subject, and urges that more experimental work be done before hypothetical compounds are assumed to be present. E. T. W.

A MINERALOGICAL CLASSIFICATION OF IGNEOUS ROCKS. ARTHUR HOLMES. *Geol. Mag.*, [6] **4**, 115-129, 1917.

It is urged that mineral composition is more important than texture and mode of occurrence in the classification of rocks, and a system based on this view is worked out. E. T. W.

THE ALTERATION OF DOLOMITE NEAR POTGIETERSRUST. R. B. YOUNG. *Trans. Geol. Soc. S. Africa*, **19**, 57-61, 1916.

In working out the geochemical changes which have occurred in this rock, the author used the following method for distinguishing calcite from dolomite: Place specimen in ferric chloride solution until stained pale yellow, wash, dry, and expose to hydrogen sulfide; a black stain is formed where calcite is present. E. T. W.

A METHOD OF DETERMINING THE REFRACTIVE INDEX OF TRANSPARENT SOLIDS AND LIQUIDS. REGINALD S. CLAY. *Engineering*, **102**, 621, 1916; **103**, 60, 1917.

For solids a 45° prism is used, the polished surface of the specimen being placed against its hypotenuse. For liquids two equal prisms with higher index are joined to form a square. The light falls on one prism, and the critical angle is read thru the other. E. T. W.

THE DISPERSION AND OTHER OPTICAL PROPERTIES OF CARBORUNDUM. H. E. MERWIN. *Geophys. Lab. J. Wash. Acad. Sci.*, **7**, 445-447, 1917.

Measurements of refractive indices for different wave-lengths of light are tabulated. For D, $\omega = 2.654$ and $\epsilon = 2.697$. E. T. W.

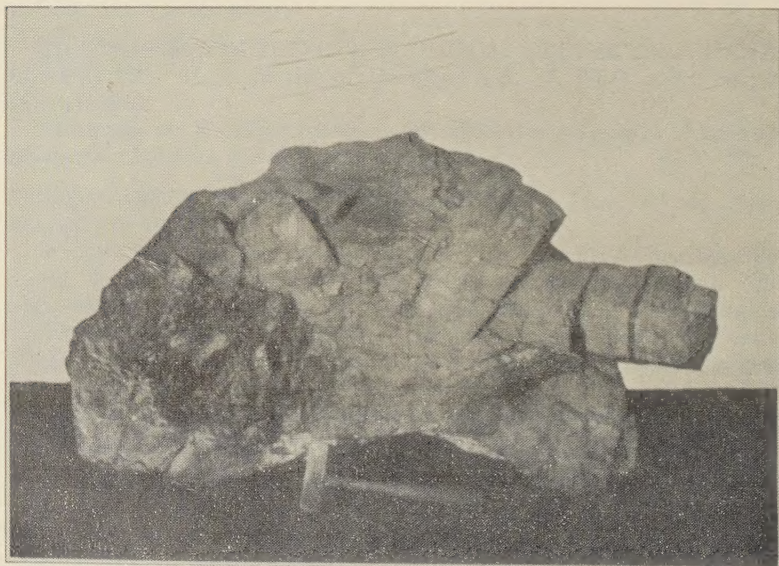
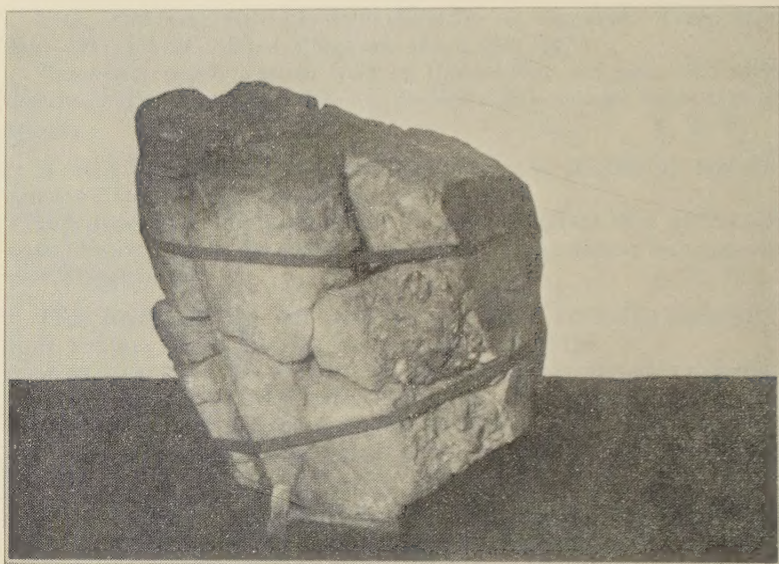
THE GENESIS OF PLEOCHROIC HALOES. J. JOLY. *Trans. Royal Soc.*, **217**, 51-79, 1917.

A mica containing good haloes around thorium minerals having been obtained, the features of these and other haloes are discussed in detail. The haloes are due to the ionizing effect of the alpha rays, and by considering the variation to be expected in this effect with distance from the source, most of of the concentric bands of the haloes can be explained. Certain abnormal bands appear to be due to a reversal, analogous to that produced by light acting for long periods on photographic plates. Views of the several types of haloes in various stages are included. E. T. W.

THE FORMATION OF DIAMONDS. OTTO RUFF. *Z. anorg. allgem. Chem.*, **99**, 73-104, 1917; thru *J. Chem. Soc.*, **112**, ii, 369, 1917.

Various methods alleged to produce diamonds have been tried, and in some cases crystals too minute for certain identification have been obtained. In two methods, however, the product showed fluorescence with ultraviolet light like that of diamond. E. T. W.

PLATE 3.



LARGE BERYL CRYSTALS, GRAFTON, NEW HAMPSHIRE.
In the collection of the Boston Society of Natural History.